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BUILDING ENERGY SIMULATION USERNEWS

FOR USERS OF ENERGYPLUS, SPARK, DOE-2, BLAST, GENOPT, BUILDING DESIGN ADVISOR, ENERGY-10 AND THEIR DERIVATIVES

What's New ?

EnergyPlus Beta 5.1 .....
The fifth planned beta test version of EnergyPlus has been released. To get a no-cost license for Beta 5.1 go to

www.gard.com/eplustest.htm

If you already have a license for testing previous versions of EnergyPlus, you don't need a new one. Go to p. 16 to learn what will be included in Beta 5.1.

DOE-2.1E Documentation on a CD!! .....
Those good people at the Energy Science and Technology Software Center have scanned most of the DOE-2.1E documentation onto a single CD. Cost is only $100; see p. 17 for ordering info.

VisualSPARK 1.0 Release .....
VisualSPARK 1.0 is now available! Tutorial starts on p. 2, purchasing information on p. 15. Website at:

http://SimulationResearch.lbl.gov

New DOE-2 Consultant .....
Welcome to Dale R. Broughton, P.E., of Phoenix, AZ, please turn to p. 21.

New DOE-2 Based PC Program .....
Finite Technologies released FTI/DOE 3.0, see p. 22 for more information.

DOE-2 Used for NY Hall of Science .....
Steven Winter Associates recently used DOE-2 for a 47,000 ft^2 extension to the New York Hall of Science (shown below). You'll find details about the project at http://www.swinter.com

What's Inside ?

Features

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VisualSPARK 1.0: A Tutorial for the VisualSPARK GUI

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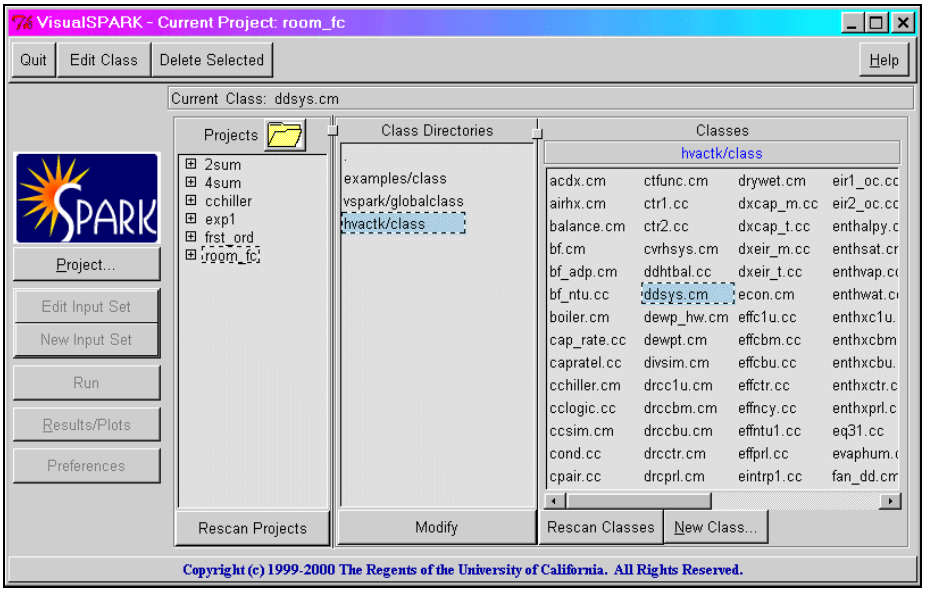
We show this tutorial here to give you an idea of how VisualSPARK is used to set up and run simulation models. Please see the end of the tutorial for web addresses. In the text of this article, references to buttons are enclosed in a box, *file_names* and *directories* are italicized, and **menu_selections** are emboldened.

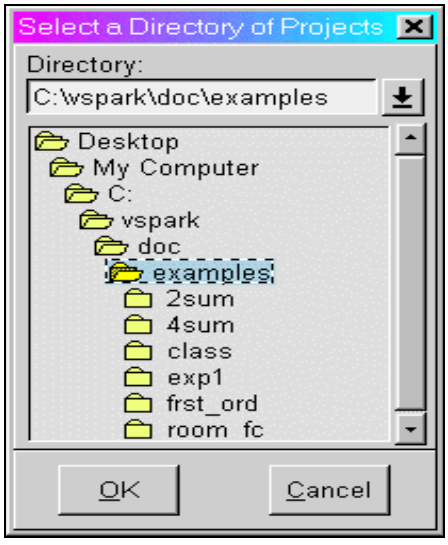
The Main VisualSPARK Window

The VisualSPARK graphical user interface for the Microsoft Windows environment[1] is available as a more user-friendly environment than the command line. You can start VisualSPARK in either of two ways:

- You can go to the *vspark* root directory and type: d:\vspark> **visspark <enter>**
- You can select VisualSPARK from the Windows **Start | Programs** menu.

The VisualSPARK main window on the Windows desktop.....➔ This screen has three principal panels: Projects, Class Directories, and Classes. There are also command menu bars across the top and down the left side. The commands available in the menu bars will change depending upon which panel is active. Panels becomes active when you click the left mouse button while the cursor is in it. When the cursor is on a menu bar button, a brief description of what it does is presented in a pop-up window.



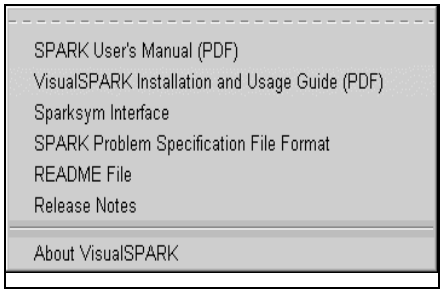


The Projects panel shows projects that are currently available. At the top of this panel there is an open folder icon, symbolizing an active Project Directory. Holding the cursor over the word Project in front of the folder icon displays the complete current project path. Clicking on the folder opens a directory tree showing the location of the project folder in your Windows file system. Typically, a Projects folder will have several Project subdirectories with individual projects, i.e., SPARK problems. In turn, each project can have one or more subdirectories, e.g., *2sum_inp* below *2sum*. These subdirectories represent particular input sets for the project, so you can run the problem with different input data and run-control information. ➔

In order to execute SPARK, one of these input set directories must be selected.

1 An almost-identical interface is available for UNIX and LINUX

The Class Directories panel shows class directories currently available for use in the project selected in the Projects panel. These are initially set to the classes defined in classpath.env file but the paths may be rearranged or new paths added with the Modify button at the bottom of the panel. Once changed, the new class path list is saved with the project information. The Classes panel shows the classes in the directory currently selected in the Class Directory panel. Double clicking, or selecting and pressing Edit Class, for one of these classes opens the class file for editing. Note Rescan below the Projects and Classes panels. While VisualSPARK can often automatically update the panel displays for changes made, it may not be aware of certain changes, e.g., adding a new project. Rescan forces panel update to deal with these situations.



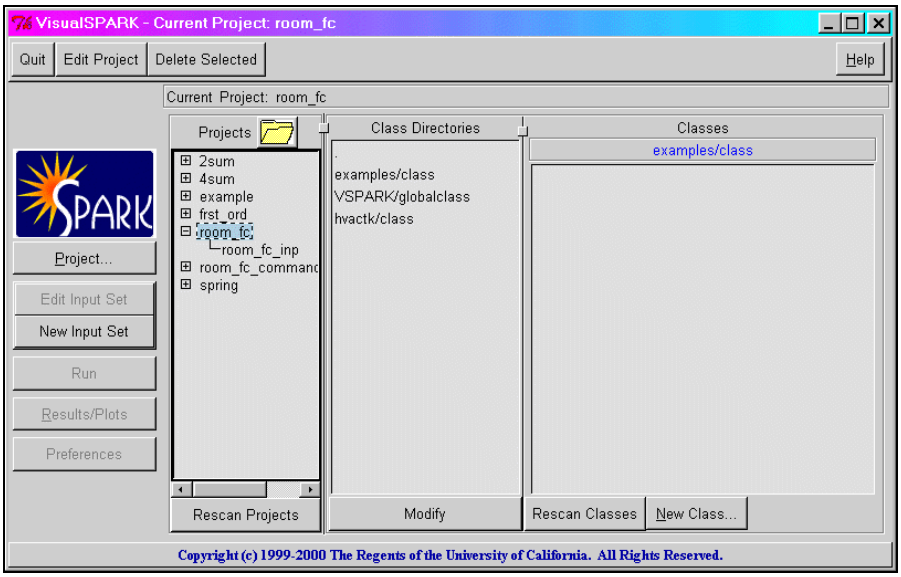
The command menu across the top of the main screen offers functions related to controlling VisualSPARK, such as Quit and Help, or editing classes and projects. Quit exits the VisualSPARK interface, while Help offers a menu with selections for various on-line SPARK documents as seen in the Help Menu.

←

Edit Project applies to either Projects or Classes.[22] It executes a text editor and loads the selected file for editing. Delete Selected will delete the selected file, whether it is a project, an input set, or a class. Eventually, a Graphical Editor button will launch a tool to allow construction of SPARK macro classes and problems in a graphical environment.

Getting Started

Let's try running the *room_fc* (air conditioned room) example from the *doc/examples* directory that comes with VisualSPARK. This is fully described in section 2.7 of the SPARK User Manual.[3] From the following screenshot we see it is one of the seven example projects. After clicking on the + sign to the left of the name, it opens to show that there is a data set or set-file called *room_fc_inp*. This contains input data along with the run-time information needed to run the model. .....→



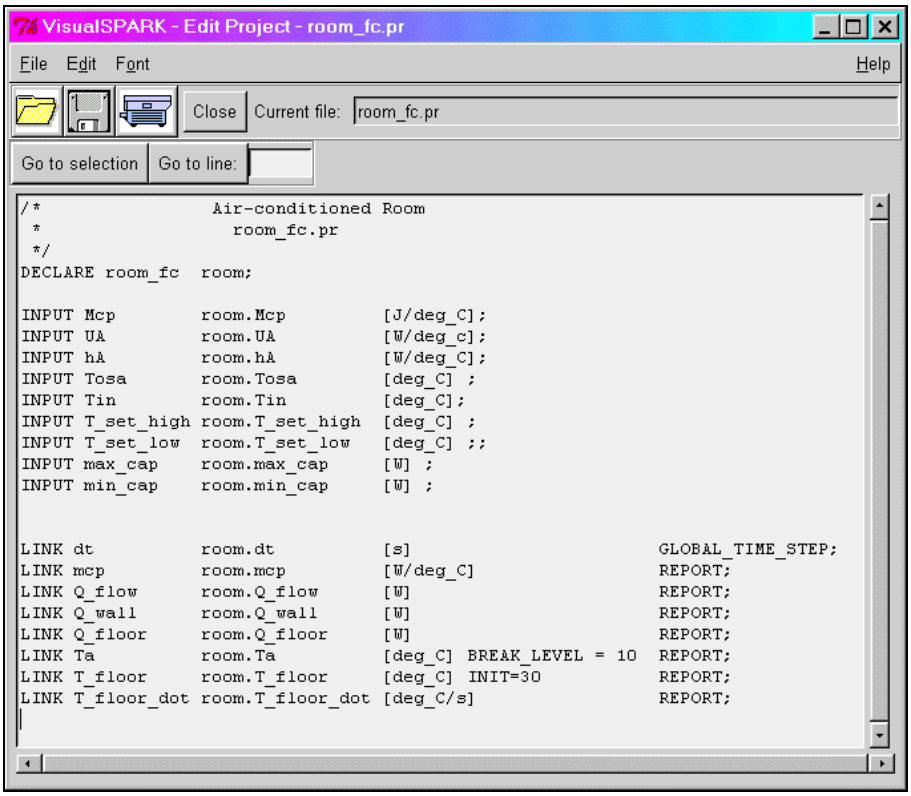
The label on this button changes depending upon cursor location. When the cursor is in the Projects panel the label is Edit Project, in the Class panel it changes to Edit Class. When it isn't in either of these panels, the button is inactive and it is labeled Text Editor.

2 The label on this button changes depending upon cursor location. When the cursor is in the Projects panel the label is Edit Project, in the Class panel it changes to Edit Class. When it isn't in either of these panels, the button is inactive and it is labeled Text Editor.

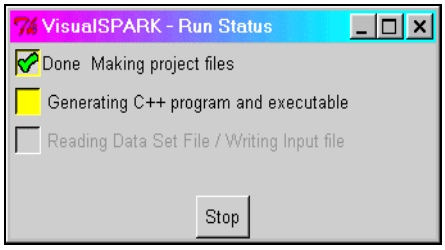
3 User Manual may be downloaded from http://SimulationResearch.lbl.gov/ > VisualSPARK

Now let's look at the SPARK code for the model itself. Re-select the project by clicking on *room_fc* and notice that the second button in the top of the VisualSPARK panel changes from Text Editor to Edit Project, signifying that if it is pressed, the editor will start with the project's .pr (problem) file. Press it to see this screen ➔

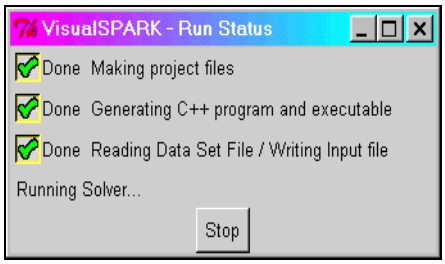
Here, we could make changes to the problem, which is written in the SPARK language. For now, close the Edit Project window.



Running the Model



Let's go ahead and use the room_fc model as is. Click on the data set called *room_fc_inp* under the project label room_fc in the main panel. This selects the data set with which we will run the model. Next, press Run on the main panel and an information window will pop up showing the progress of building, compiling and running the model.
➔



There are four steps:

1. Assembling the relevant files into a C++ program.
2. Compiling the C++ program and linking with the solver library.
3. Reading the data set and creating the input file for the solver.
4. Running the solver.

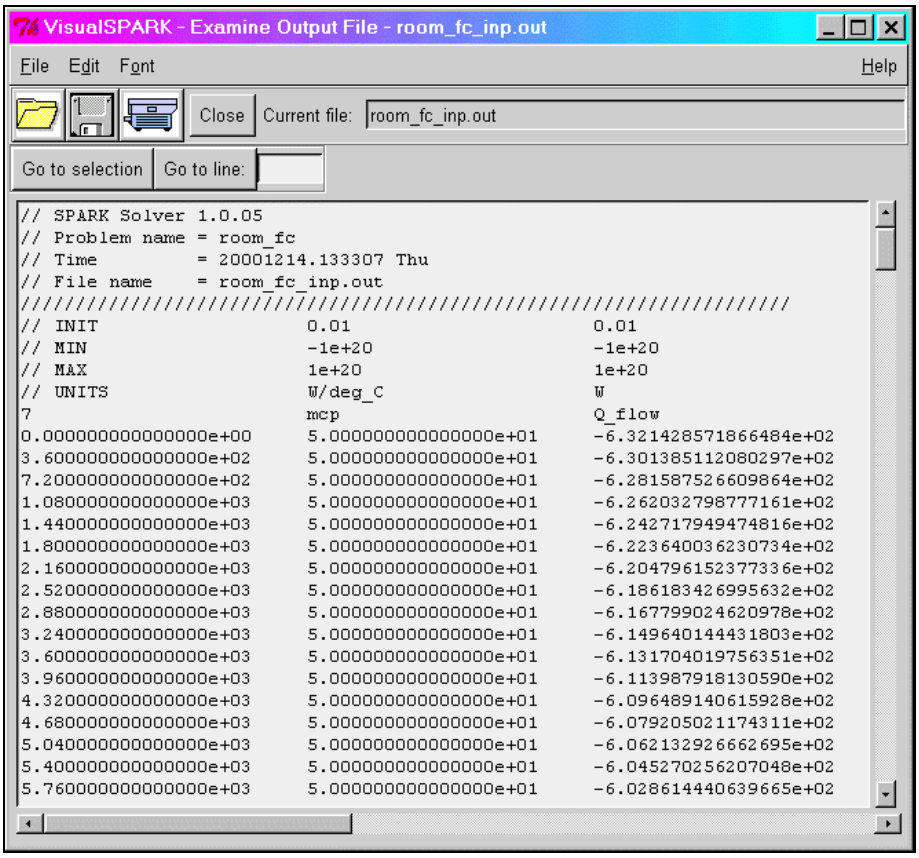
➔

The yellow color indicates the current step and a checkmark will appear when the step is complete. At any step you may stop the process by pressing Stop. In the final step you will see a message that it is running the solver.

Viewing the Results

As Text

After a run (whether successful or unsuccessful), you may examine the results data either as a table of numbers or a graph. The former is achieved by choosing **View results file (as text)** from the "Results/Plots" menu in the main panel. Here is our *room_fc* example.....➔

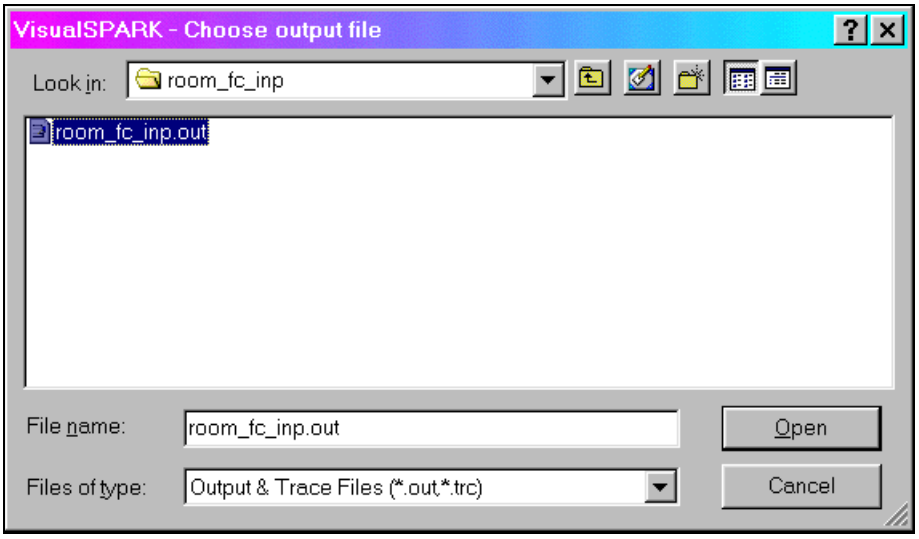


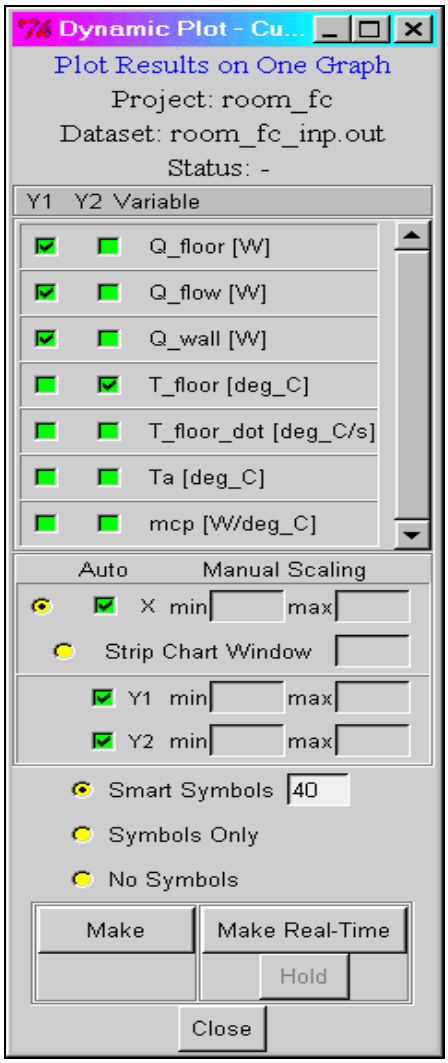
Graphing The Results

The text view is not very exciting and it is difficult to see any trends in the data. Let's look at a graph of the data instead. There are two major types of graphs: "Dynamic Plot" and "Phase Plot". Dynamic Plot is simply a graph of the output variables versus time. Phase Plot allows you to plot one variable (X) versus another (Y) to the correlation between variables as a function of time.

The Basic Dynamic Graph

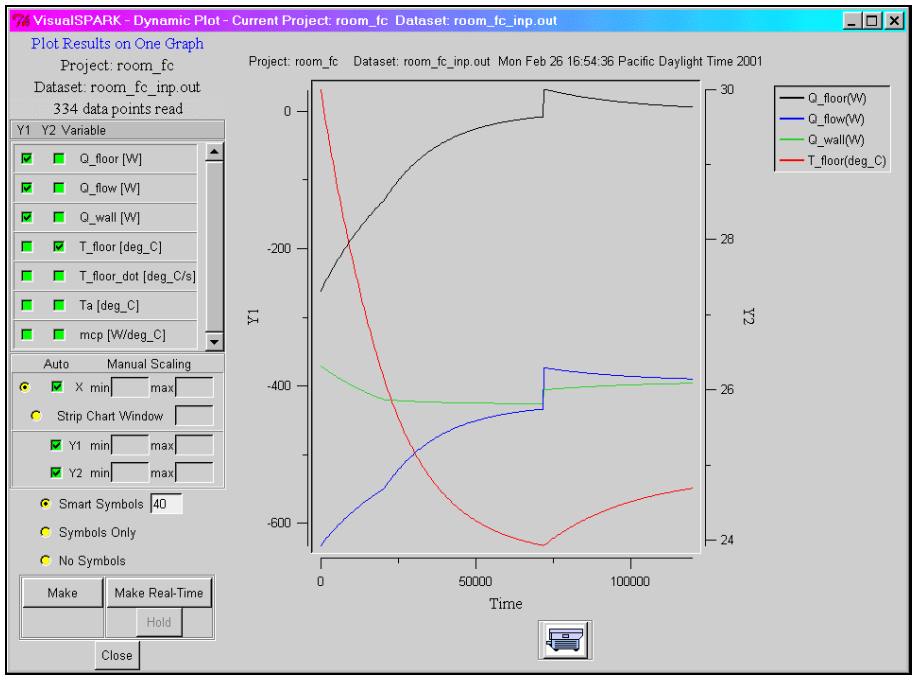
In the Dynamic graphs, you may either have a different graph for each variable to be plotted (labeled **1 variable per plot** in the menu) or plot multiple variables on either of two Y axes (labeled **Dynamic, multiple variables per plot**). Let's make a graph of multiple variables. After choosing the **Dynamic multiple variables per plot** from the **Results/Plots** menu, we choose the output file, called *room_fc_inp.out* from the dialog box.....➔





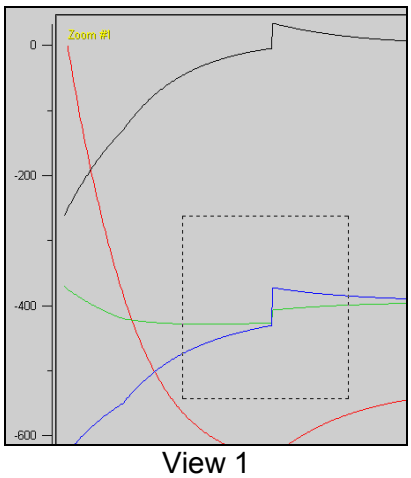
After clicking on the output file name and clicking Open you are presented with a panel allowing you to choose which variables to plot, and on which Y-axis you want it. Click on the green box of each variable you wish to see plotted:

For now, we will leave the other settings at their default. These allow you to manually scale the axes, show a "window" or "strip chart" of the data in real time as the solver runs, and control the appearance of symbols on the curves. Now that you've chosen the variables, press Make to create the graph

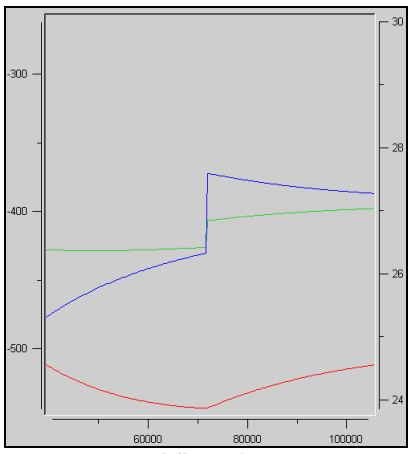


Now zoom in on the center of the graph where the curves make a "step". Click the mouse on one corner of a rectangle defining the area of interest, drag the mouse to the other corner and click again. This will zoom the area you outlined (View 1).

You can see the "Zoom #1" message and the rectangle. After the second button press we see the area of interest (View 2). You may zoom in repeatedly for many levels. To unzoom, press the right mouse button once for each zoom level.



View 1

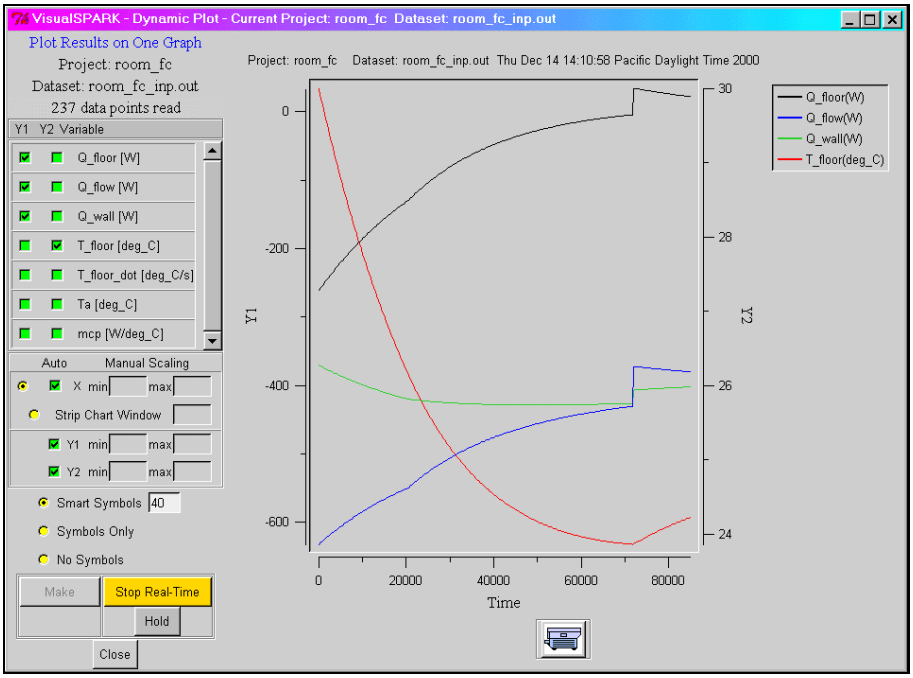


View 2

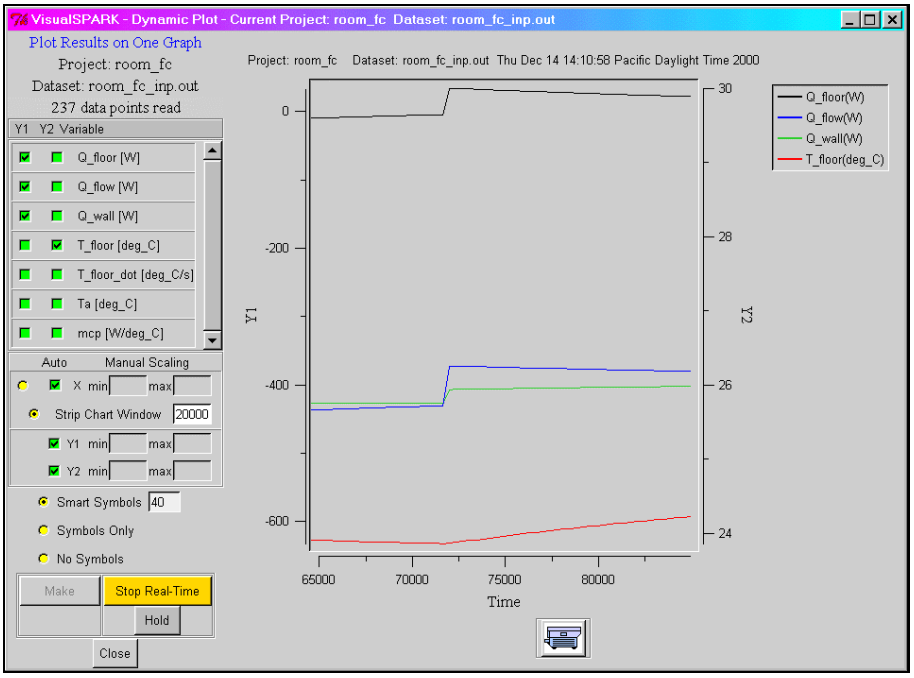
There is a printer icon at the bottom of the graph, which will let you print your graph. Under Windows, it will pop up the printer chooser dialog. Under Unix (Linux, Solaris, etc) it will print to the default printer defined in the PRINTER environment variable, or the printer named in the entry next to the printer icon, if it is not blank.

Real-Time Graph

Now that you have the graph displayed we can try the real-time graphing feature of VisualSPARK. When a simulation runs for a long time, you may wish to see results before it is finished. Real-time graphing allows you to stop the simulation if it is not running correctly, or simply to check its progress. At the bottom of the graph panel there is a button labeled Make Real-Time. Press it and then press Run in the main panel and watch the curves change as the data is written to the output file. During the simulation, pressing Hold will freeze screen updates of the curves. The Hold button will change to Resume, signifying that you may press it to resume screen updates. After pressing Make Real-Time its label changed to Stop Real-Time. This indicates that you may stop the graph by pressing it. This screen-shot is the graph in progress....➔



You may have noticed the symbols appear on the curves for a time and then disappear. This is caused by the "smart symbols" feature. There are several radio buttons above the buttons to create the graph, which let you control when symbols appear on the curves. The **smart symbols** radio button tells the graphing program to put symbols on the solid line only when the number of symbols is not greater than the number in the box to the right. When the number of points exceeds that value (in our case 40) then only a solid line is drawn. The radio button labeled **Symbols Only** means to plot symbols on the curves but not connect them with lines. The **No Symbols** button means to not show any symbols, only a solid line.



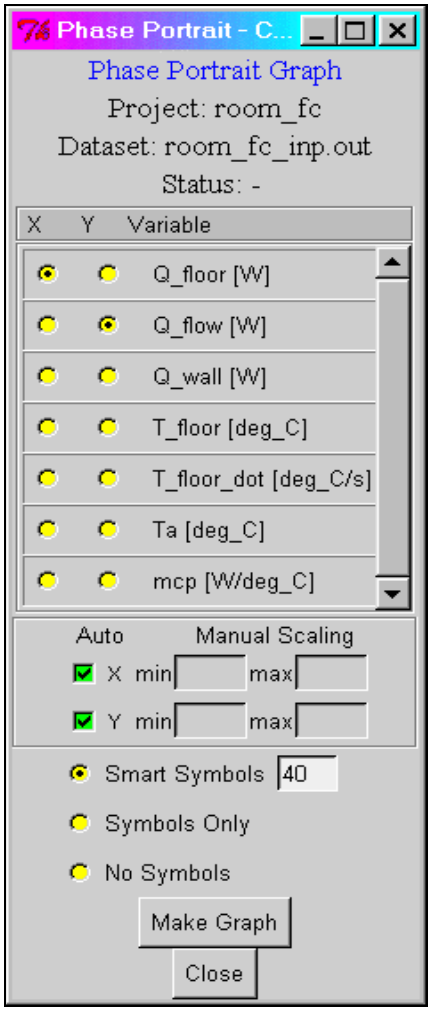
Strip Chart Graph .....➔

Just above the symbol control section is the scaling section. This allows automatic scaling of the axes (the default) or you may choose your own minimum and maximum values for the X-, Y1- and Y2-axes. Notice the radio button labeled **Strip Chart Window**. During the creation of a real-time graph you may only want to look at the latest period of data. After selecting **Strip Chart Window**, enter the Window Size in the box to the right. Window Size is the amount of time in units of X values to show in the window. The example shows the latest 20,000 time units of data.

Phase Plot

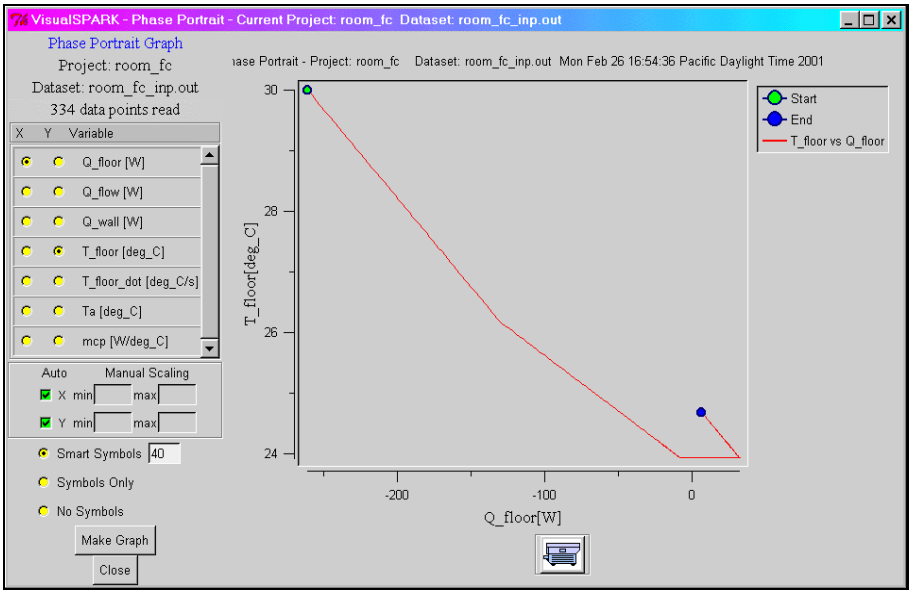
Phase plot shows the relation between any two variables, as one is graphed versus the other, for each time point. Let's take a look at the relation between Q_floor and T_floor. Choose Phase Plot from the **Results/Plots** menu and choose the output file as before.

← You will see this panel.



Q_floor is already selected for the X axis, so press the radio button under the "Y" for T_floor to select T_floor for the Y axis. Now press Make Graph near the bottom of the panel to create the graph.

↓

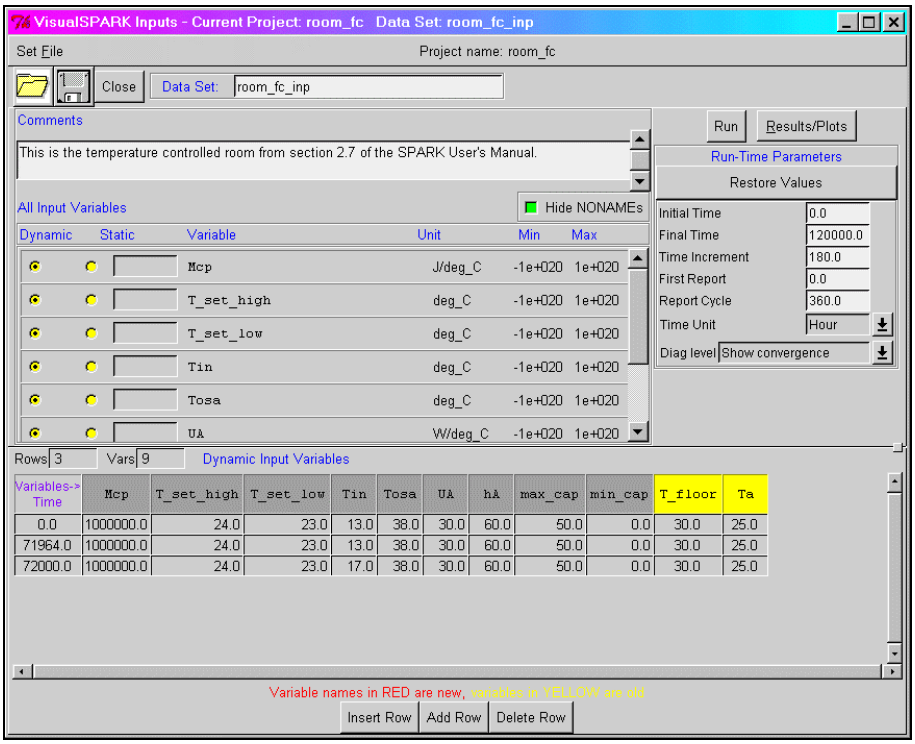


Here we can see that they are more or less linearly related at the start but as Q_floor approaches 0, T_floor suddenly increases and then is flat while Q_floor increases until about 50, at which point they are again linearly related. The green-filled circle indicates the first data point and the blue-filled circle the last data point.

Modifying the Input Data

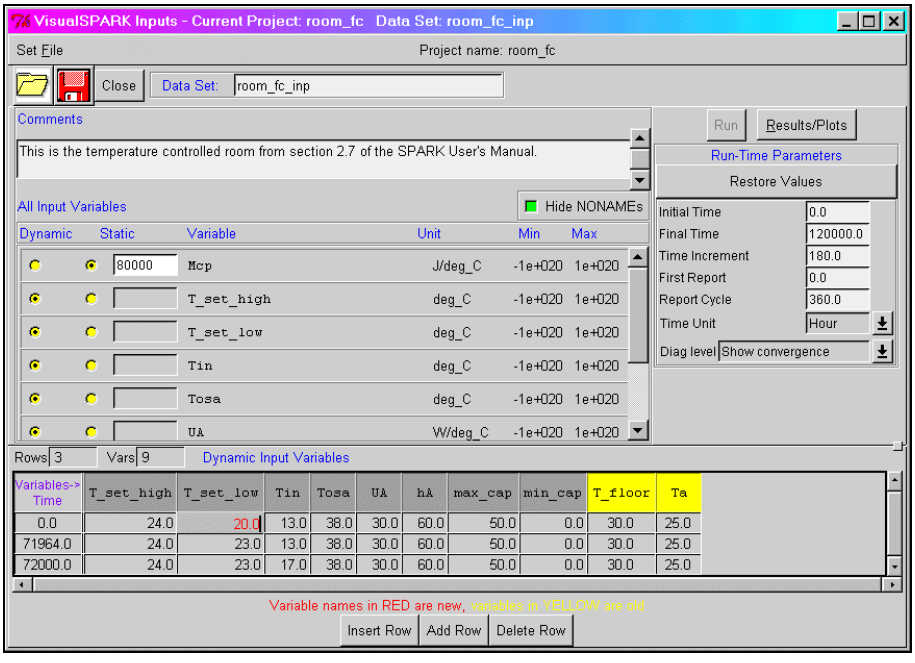
Let's play a little with the input data to see how it affects the model. Click on Edit Input Set in the main panel. If it is grayed out (inactive) then you must reselect the *room_fc_inp* data set in the Projects area.

Here is the input data editor.....➔

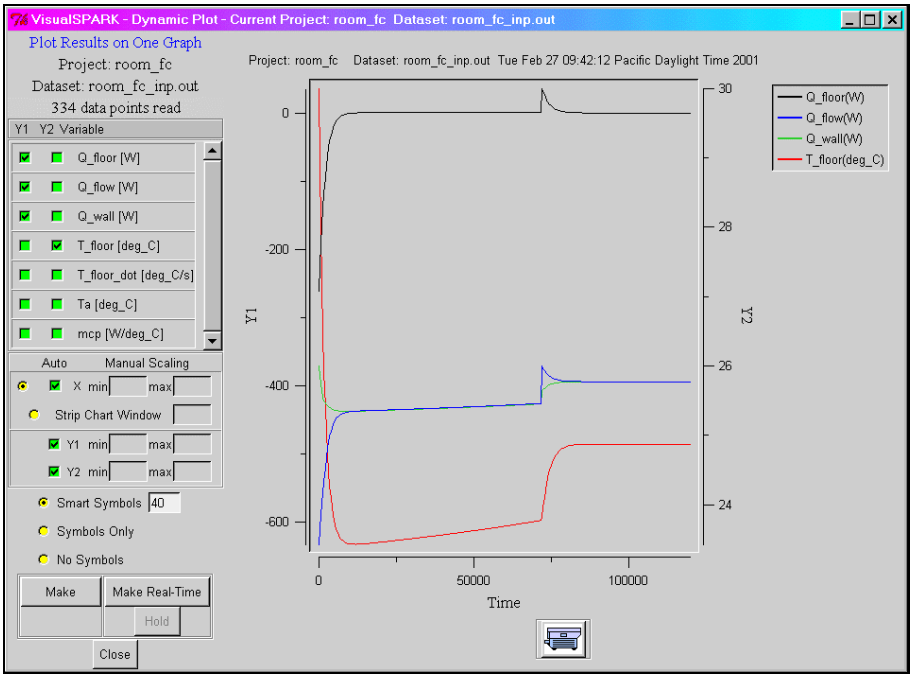


In the upper section is a **Set File** menu to load and save a data set file, and icons below that which do the equivalent. Below that is an area where comments may be inserted and saved with the data set file. Further down is the section that lists all the input variables for the problem. The radio buttons labeled **Dynamic** and **Static** tell the solver whether the value may change with time (Dynamic) or is fixed (Static). If Static is selected for any variable then the box to the right becomes active, allowing you to enter a value for that variable, which it will have for the entire run. On the right side are the **Run-Time** parameters: initial time, final time, time increment, time of first reporting, time between reports, time units and diagnostic level. The diagnostic level is described in section 3.11.5 of the SPARK User Manual. The bottom section contains a table of the values for all the input variables that are checked as Dynamic. The width of the columns may be manually changed to show longer variable names or larger values, as is the case here with the values for the variable Mcp. To change the width of a column, click the right mouse button on the vertical line between the variable name cells and drag the mouse right or left to resize it. You should see a "+" cursor as you hold down the right mouse button.

Here's where we'll make some changes and see how they affect the results. Simply click on a cell and replace the value. Let's make Mcp a static variable, and change the T_set_low variable at time 0.0 from 23.0 to 20.0. Here Mcp has been changed from a Dynamic (time-varying) variable to Static by selecting the Static radio button. Then a value (80000) was entered in the space to the right to give it a value that will be used throughout the run of the model. Notice that it has been removed from the "Dynamic Input Variables" table at the bottom.



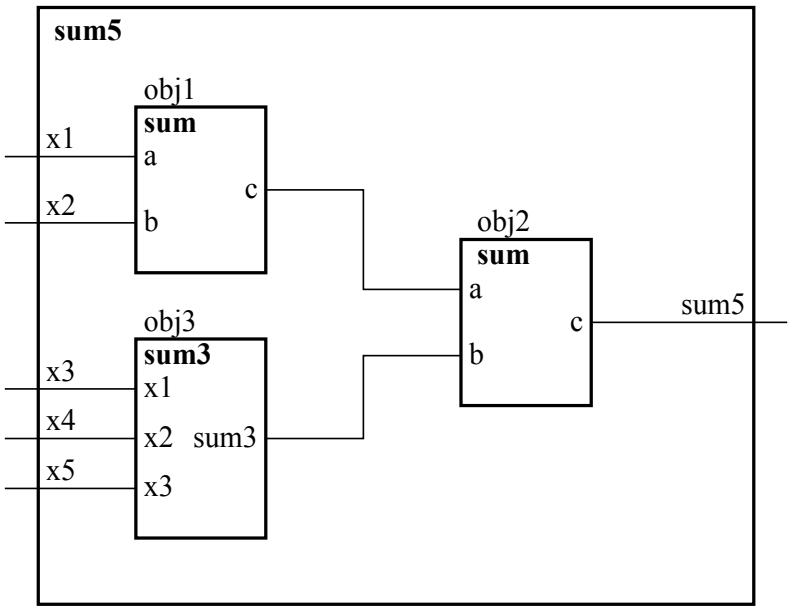
To change a value of a dynamic variable ("T_set_low" in this case), simply click on the value in the cell and enter a new value. Notice that the 20.0 for "T_set_low" is red (it looks gray in printed documents), indicating that it has been changed. Also notice that the floppy disk icon at the top changed to red (also looks gray in printed documents) indicating that something has changed in the data, and the Run button has been disabled, i.e., clicking on Run doesn't do anything. This is a safety to ensure that you save any changes before making a run.



Create a New Project and Supporting Classes

Create a New Project

In this section we will create a new project and its supporting classes. The project finds the sum of five numbers. Here is a graphical representation of it....➔



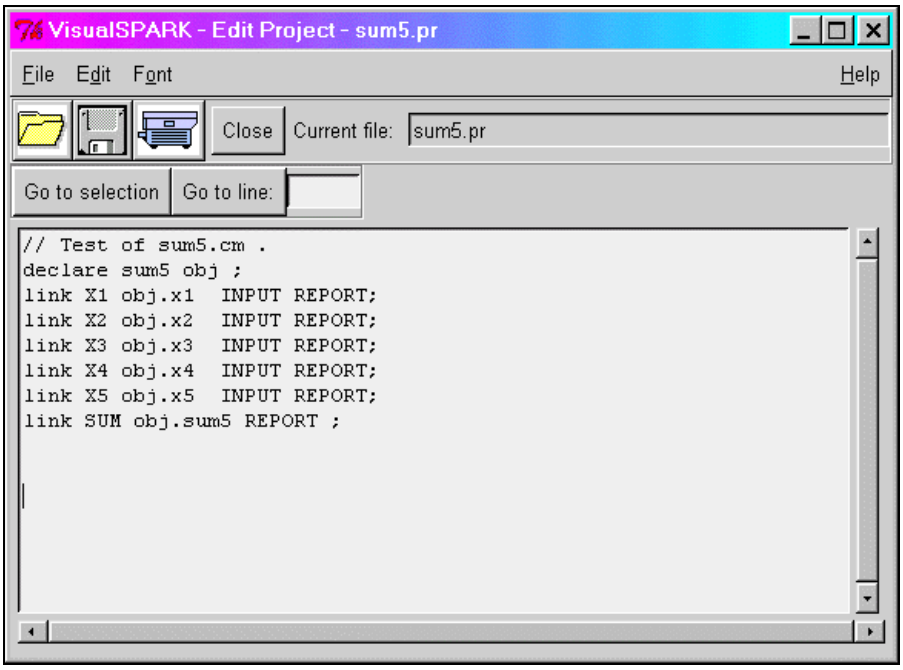
After starting VisualSPARK, click the **Project** menu and select **New Project.** When a dialog pops up asking for a project name, enter *sum5* followed by the Enter key. This will make a new entry in the Projects list and pop up an editing panel into which the SPARK code for the project may be typed. To minimize errors, cut and paste[3] this text into the edit window....➔

```
// Test of sum5.cm .
declare sum5 obj ;
link X1 obj.x1  INPUT REPORT;
link X2 obj.x2  INPUT REPORT;
link X3 obj.x3  INPUT REPORT;
link X4 obj.x4  INPUT REPORT;
link X5 obj.x5  INPUT REPORT;
link SUM obj.sum5 REPORT ;
```

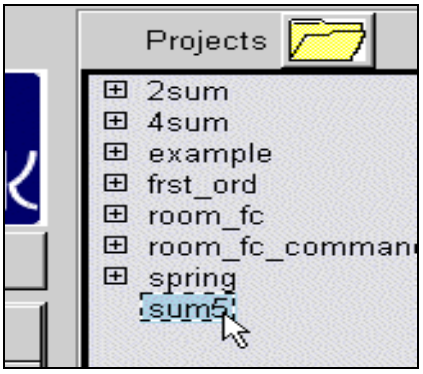
Now, in the edit panel click Save (the floppy disk icon) then Close.

3 Using Microsoft Windows platforms, select the text with the mouse, press Control-C, click on the VisualSPARK edit panel and press Control-V. On Unix platforms, select the text with the mouse, click on the VisualSPARK edit panel and press Control-Y (yank).

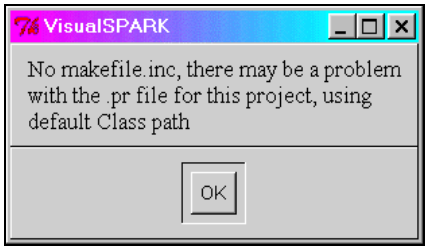
Your window should look like this.....➔

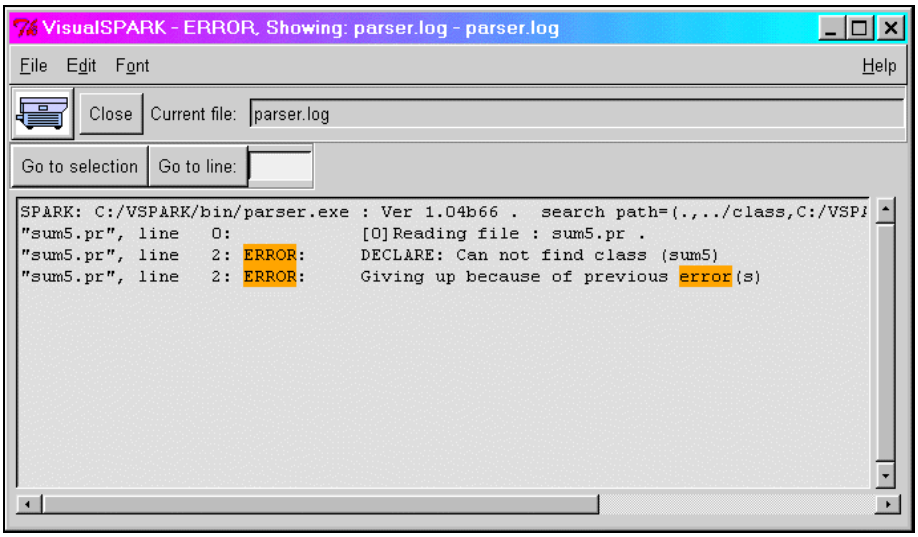


In the main window click *sum5* in the Projects area.



An error message dialog will pop up saying that there may be a problem with the .pr file

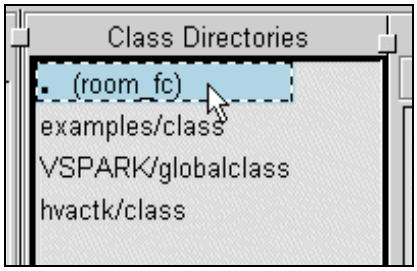




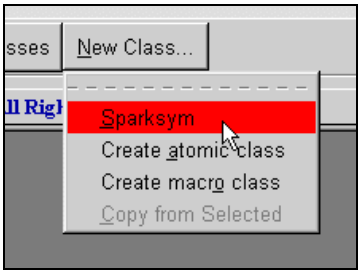
This occurs because we haven't yet created the sum5.cm class that we referenced in our sum5.pr problem file; click OK. When the error dialog pops up, a window showing the actual error is also popped up.....➚
This indicates that the sum5 class is not defined. For now click Close.

Create the Supporting Classes

The Atomic Class
Now, back in the main window, under the area labeled *Class Directories*, select the first entry, a dot with the project name in parenthesis, i.e. (room_fc), (View 3).



View 3

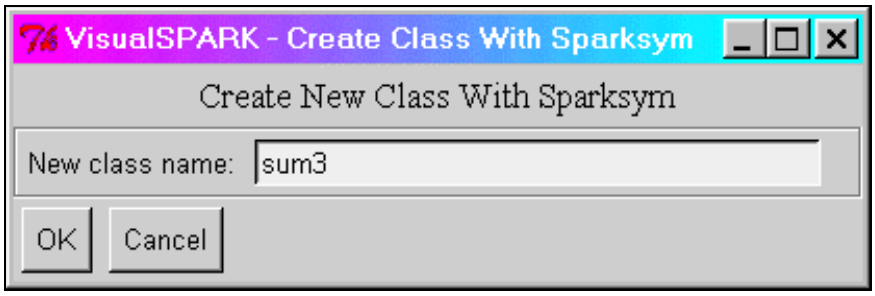


View 4

Next, under the right-most panel in the main window click New Class and select **Sparksym** (View 4).

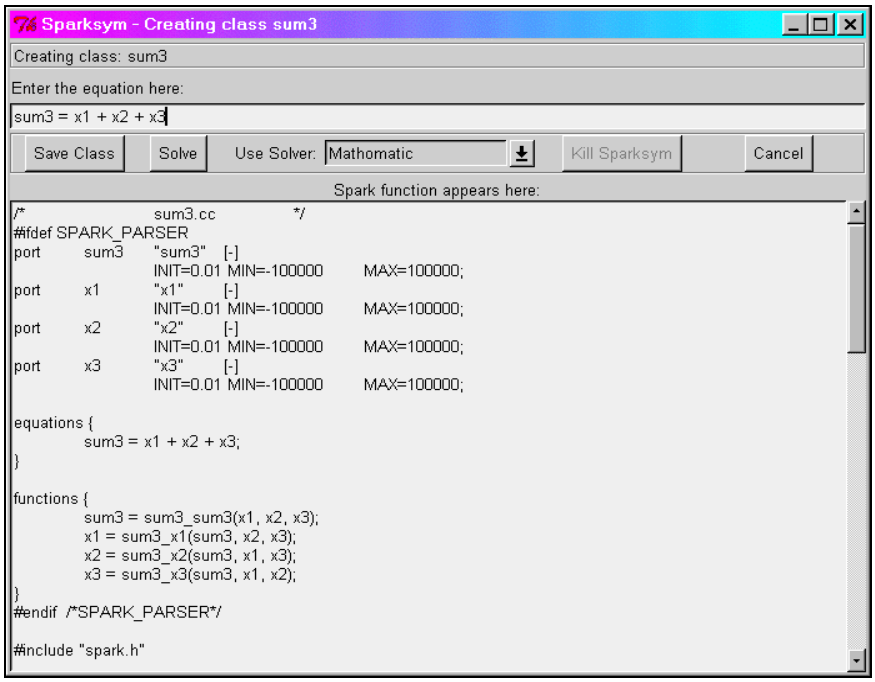
This will let us define our sum5 class using a simple equation solver called "Mathomatic."

A dialog will pop up asking for the name of the class. Type *sum3* for the class name and then OK....➔



A window with the title *Sparksym - Creating class sum3* will appear. Into the area labeled *Enter the equation here:* type the equation **`sum3 = x1 + x2 + x3`** and click Solve or press Enter.

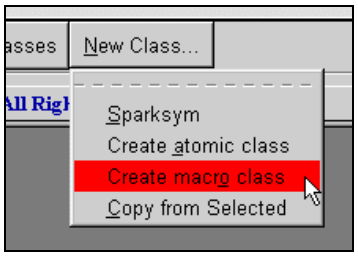
The equation will be solved in terms of each variable sum3, x1, x2, and x3, and produce the SPARK programming code for the atomic class. Here is what it should look like at this point.....➔ Click Save Class to save the new class and close the window.



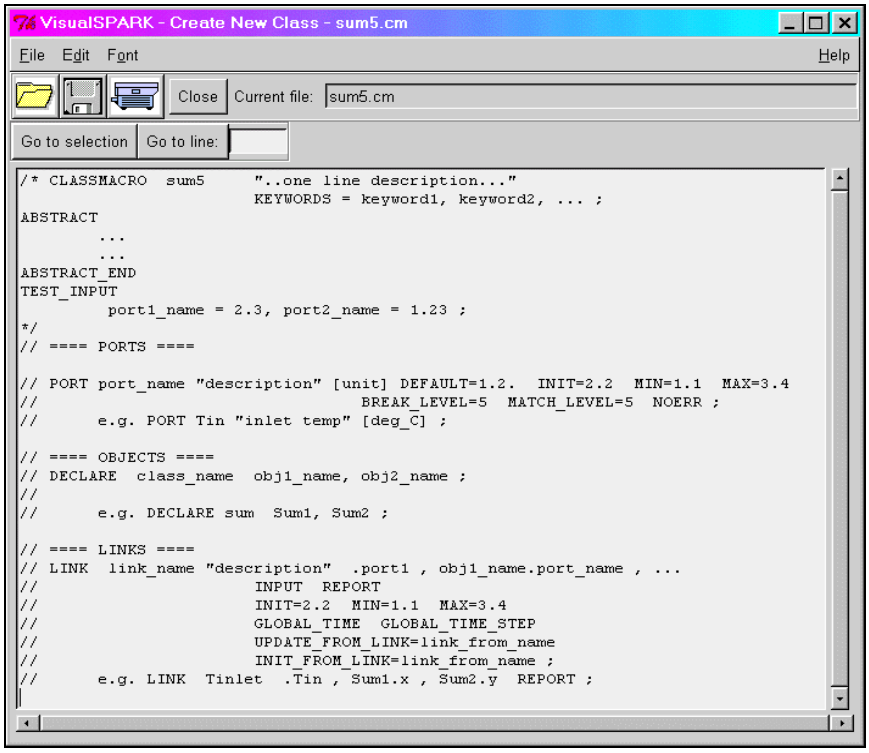
Note that the name of the class just created, sum3.cc now appears in the *Classes* panel of the main window.

The Macro Class

Going to the main VisualSPARK window, Click New Class then choose **Create MacroClass**



This pops up a window labeled *Create New Class*. Enter *sum5* as the name of the new class; click OK. You will then see a window containing, as comments, a template macro class.....➔



Now edit this template by adding the following lines.

After the line
```
//      e.g. PORT Tin "inlet temp" [deg_C] ;
```

Add the lines
```
port x1 ;
port x2 ;
port x3 ;
port x4 ;
port x5 ;
port sum5 ;
```

After the line
```
//      e.g. DECLARE sum  Sum1, Sum2 ;
```

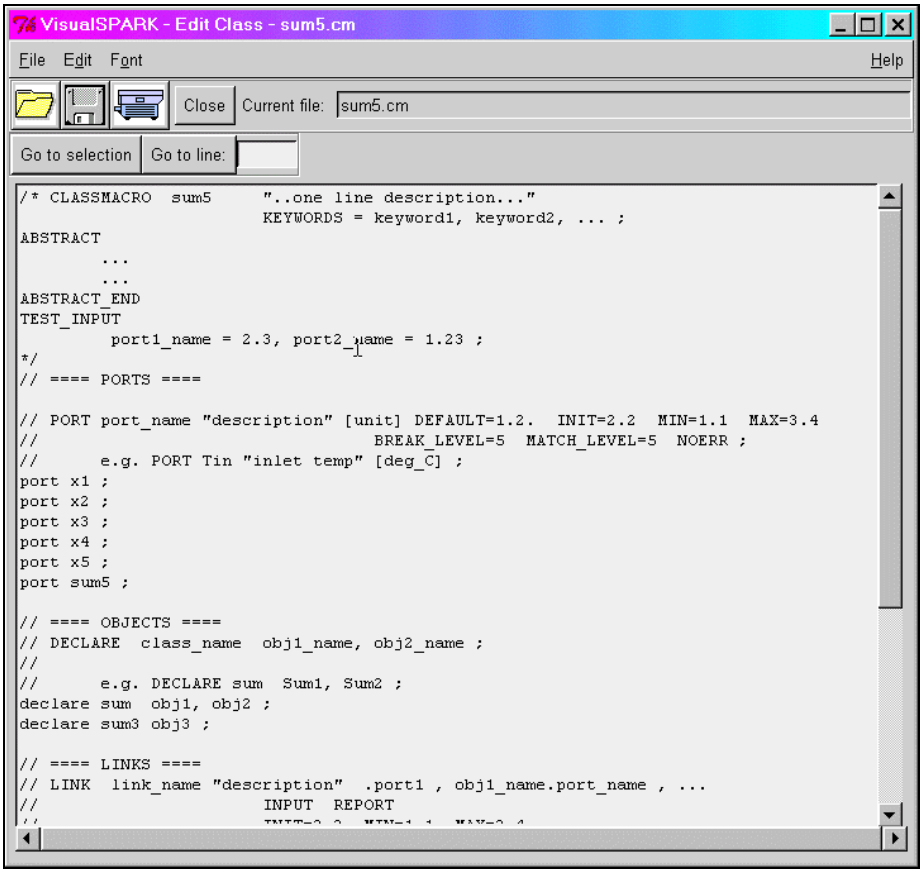
Add the lines
```
declare sum  obj1, obj2 ;
declare sum3 obj3 ;
```

After the line
```
//      e.g. LINK  Tinlet  .Tin , Sum1.x , Sum2.y  REPORT ;
```

Add the lines
```
link .x1     , obj1.a ;
link .x2     , obj1.b ;
link .x3     , obj3.x1 ;
link .x4     , obj3.x2 ;
link .x5     , obj3.x3 ;
link obj1.c  , obj2.a ;
link obj3.sum3 , obj2.b ;
link .sum5   , obj2.c ;
```

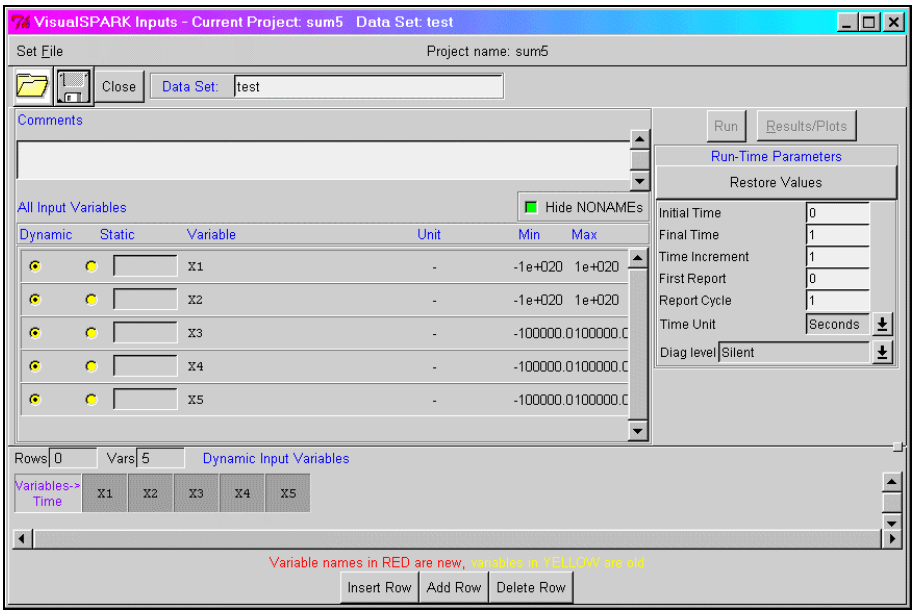
You should now have this.....➔

Now click Save (the button with the floppy disk icon) and Close.



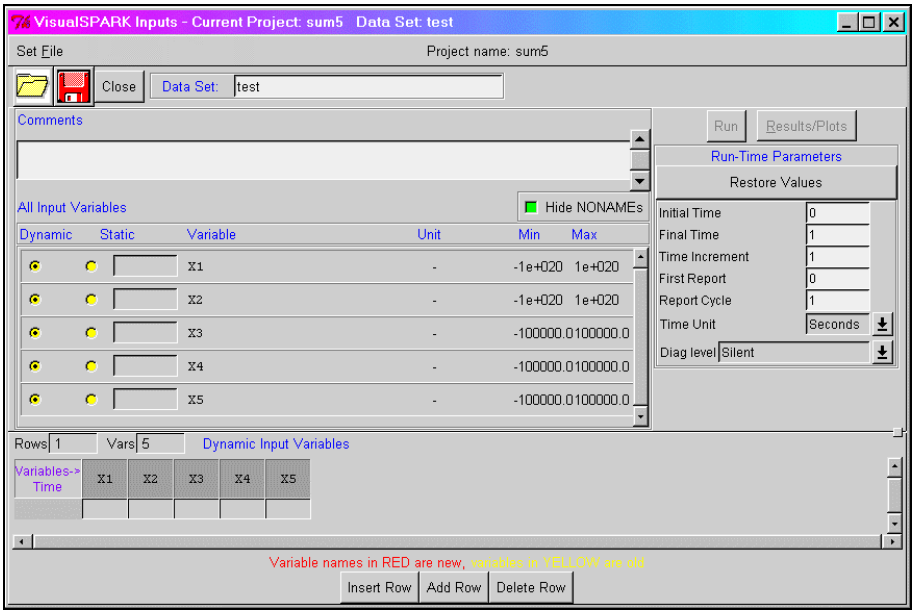
Create the Input Data

Next, we will create some input data for the model so that we can test it out. Revisit the project file *sum5* by clicking on its name in the *Projects* area and clicking on **New Input Set** to the left of the *Projects* area. A dialog will pop up asking you for the name of the data set. Type in *test* under the label *Input Set Name* and click OK or press Enter. You will get this window.....➔



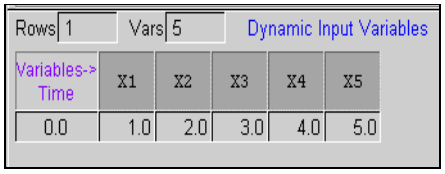
In the area labeled Comments you may put any comments that help you remember what the data set is for. Below that you will see a list of all input variables for the *sum5* problem. You may choose to make them time-varying (Dynamic) or constant (Static) by selecting on the appropriate button for each variable. When set to Static, the area to the right of the button will turn white, indicating that you may enter the static value there.

In the bottom section is a table where the time-varying data for the dynamic variables is entered. At the beginning there are no rows for the data, so the first thing to do is to press Add Row. The Add Row button adds a row *after* the selected row (when there is more than one row); Insert Row inserts a row *before* the selected row; Delete Row deletes the selected row. At this point you should have this window.....➔ There is one thing to notice at this point. After adding the row the floppy disk icon at the top turned red indicating that something in the data set had changed. If you try to close the window without saving the data set you will first be prompted to save it or discard your changes.



The relative size of the top and bottom sections may be changed by grabbing the small square two-thirds of the way down on the right side with the mouse and dragging it up or down. Here we have moved it up a little to make more room for the data table in the bottom section.

For this problem we could either make all the inputs static to show the solution of one set of inputs or we may make them dynamic in order to have several sets of inputs. They needn't actually be *time* varying, but we can use that concept to have multiple sets of inputs.



Now enter some values for each input variable. First, click under the *Time* label in the table and enter a "time" value of 0. Then either press the right arrow key or click in the cell for variable X1 and enter 1. For X2 enter 2 and so on to X5. Be sure to press Enter after the last data value.

You should have something like this. Now click the floppy icon to save the data. That's it! You have successfully created a new VisualSPARK project and two SPARK classes – one atomic class and one macro class. Now you can click RUN to run the model using your input data, then view the data as outlined above.

Remember, you must always save any changes you make in the input data panel before you may make a run.

❧

VisualSPARK

Release of Version 1.0

Available from Lawrence Berkeley National Laboratory,
VisualSPARK 1.0 allows you to build customized models of complex physical processes by connecting calculation objects. It is aimed at the simulation of innovative and/or complex building systems that are beyond the scope of programs like DOE-2 and EnergyPlus.

The main elements of VisualSPARK are a **user interface**, a **network specification language**, a **solver** for solving simultaneous algebraic and differential equations, and a **results processor**. With the network specification language you link the calculation objects into networks that represent a building's envelope and/or HVAC system. The solver solves this network for user-specified input parameters. With the results processor you graphically display the results of the calculation.

VisualSPARK runs under the Windows 95/98/NT/2000, SunOS, Solaris, Linux and HPUNIX operating systems.

VisualSPARK costs $250. To purchase the program, go to
http://SimulationResearch.lbl.gov > VisualSPARK > Purchase

If you would like to get an idea of what the program does before purchasing it, you can review the SPARK User's Manual, which can be downloaded from http://SimulationResearch.lbl.gov > SPARK

VisualSPARK was developed by the LBNL Simulation Research Group and Ayres Sowell Associates, with support from the U.S. Department of Energy, Drury Crawley, program manager

http://SimulationResearch.lbl.gov > SPARK

EnergyPlus Beta 5.1

The fifth of five planned beta test versions of EnergyPlus was released in February. There will be multiple releases of Beta 5 (i.e. 5.0, 5.1, 5.2, up to the release of Version 1.0 in April).
To get a no-cost license go to www.gard.com/eplustest.htm.
If you have an existing beta test license you don't need a new one.

Highlights of Beta 5.0:

Phase I Energy Meter Reporting
Low-Temperature Radiant Heating/Cooling
Flow-Dependent Interior Surface Convection
Exhaust Air Heat Exchanger
Thermal Comfort Options
Evaporative Cooler Models
Steam Absorption Chiller
Air Flow Sizing
Improved Sky Model for Daylighting Calculation
Ability to read multiple interval per hour weather data files
Return-Air Plenum
Enhanced return air heat gain (from lights) calculation
Flat-Plate Heat Recovery
Translator from CAD to EnergyPlus Input

The EnergyPlus version 1.0 release is targeted for April 9, 2001.

EnergyPlus is being developed by University of Illinois, CERL, Oklahoma State University and Lawrence Berkeley National Laboratory, with the assistance of the Florida Solar Energy Center, GARD Analytics, Krarti Associates, Pennsylvania State University, and the University of Wisconsin.

❧

GenOpt® 1.1

New in GenOpt 1.1 are an additional algorithm for multi-dimensional optimization, algorithms for one-dimensional optimization, and an algorithm for parametric runs in a multi-dimensional space. The new version also allows processing of multiple function values and has an improved graphical user interface.

GenOpt is a multi-parameter optimization program, available free of charge from LBNL. It automatically finds the values of user-selected design parameters that minimize an *objective function*, such as annual energy use, calculated by an external simulation program like EnergyPlus, SPARK, DOE-2, BLAST, TRACE, TRNSYS, etc. GenOpt can be used with any simulation program that has text-based input and output. It also offers an interface for adding custom optimization algorithms to its library.

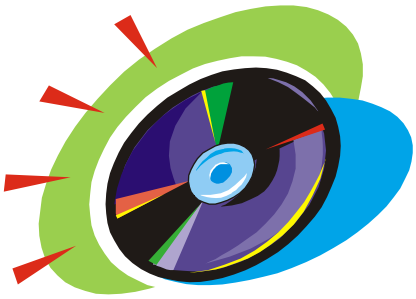
Genopt 1.1 (with user manual) may be downloaded from

http://SimulationResearch.lbl.gov > GenOpt

DOE-2 Documentation on a CD !

What's on the CD?

- DOE-2 Reference Manual (Part 1)
- DOE-2 Reference Manual (Part 2)
- DOE-2 Supplement to the Reference Manual (2.1E)
- DOE-2 BDL Summary (2.1E)
- DOE-2 Engineers Manual (2.1A)



How much does it Cost?

- Cost of the CD is $100.

Order from ESTSC:

Ed Kidd
NCI Information Systems, Inc.
Energy Science and Technology Software Center
P.O. Box 1020
Oak Ridge, TN 37831

Phone: 865/576-1037
Fax: 865/576-6436
Email: estsc@adonis.osti.gov

What Isn't on the CD?	Where to Obtain It:
▪ DOE-2 Basics (2.1E) ▪ DOE-2 Sample Run Book (2.1E)	These can be purchased separately from NTIS; details at http://SimulationResearch.lbl.gov > DOE-2 > Documentation]
▪ Update Package #1: Changes and corrections to DOE-2.1E Basics, the Supplement and BDL Summary ▪ Update Package #2: Corrections to the BDL Summary and Supplement for DOE-2.1E. For Version 107 of DOE-2.1E, added Cooled Beam System and Polygon sections to the Supplement and BDL Summary. ▪ Update Package #3: Corrections to Appendix A of the Supplement.	These can be downloaded as .pdf files from http://SimulationResearch.lbl.gov > DOE-2 > Documentation

The Building Energy Simulation User News is published bi-monthly and distributed electronically by the Simulation Research Group at Lawrence Berkeley National Laboratory, with cooperation from the Building Systems Laboratory at the University of Illinois. Direct comments or submissions to Kathy Ellington (KLEllington@lbl.gov). Direct BLAST-related inquiries to the Building Systems Laboratory (support@blast.bso.uiuc.edu).

VisualDOE 3.0

Eley Associates has released VisualDOE 3.0, a third-generation building energy simulation program. VisualDOE is used to quickly and accurately build energy simulation models that harness the power of DOE-2.1E.

VisualDOE is a 32-bit program that works with Windows 95/98/2000/NT; Version 3.0 is a complete overhaul of the program. On the "surface" the program looks like Version 2.0; the difference is that the four elevation views have been replaced by one isometric view, which can be rotated to expose all sides of the building. Multiple plan views have been combined into a single view that can display one or more blocks simultaneously. And, like before, you can see the physical characteristics of your model as you build it.

VisualDOE has eliminated the need for users to labor over creating and/or positioning individual surfaces. Instead, users work with blocks, each representing a group of rooms, complete with correctly positioned surfaces, windows, lighting systems, and other modeling features. Blocks can be stretched, stacked and otherwise arranged to create just about any building form.

Beginners will appreciate the drag-and-drop ease of creating building models, built-in templates for standard building types and appropriate default values for HVAC systems.

Advanced users can now schedule central plant operations, define custom load ranges for central plant equipment management, and edit DOE-2 input files from within VisualDOE 3.0

New features

Custom Block Editor

Allows the creation of complicated block shapes.

Custom Facades

Can be created with windows of any size and the windows may be repositioned.

Skylights

Can be created (and repositioned) for rooms with exposed roofs.

Schedules and Organizers

Common elements that are repeated in a building model can be placed in a schedule and referenced as needed.

DOE-2 Editor

DOE-2 input, output and BDL files can be viewed and edited directly in the main application. Existing input files may also be used.

continued ...

Central Plant Scheduling

Heating and cooling availability can be scheduled by time of day and time of year. In addition, custom load ranges can be entered to control multiple chillers and/or boilers.

3D viewer

A new viewer enables users to zoom and rotate the 3D view of the building and select building components to be viewed.

Schedule Editor

A new editor makes it easy to create and edit schedules.

Weather Files

The Green Design Tools CD includes TMY weather data files for 239 U.S. locations.

Construction Editor

Makes it easier to create and edit a construction including its layers and materials.

Utility Rate Editor

Includes the demand ratchet to be input at the utility rate level and time charge period level.

99 Design Alternatives

A project file may contain up to 99 design alternatives (maximum of 25 in VisualDOE 2.6).

DOE-2.1E Technical Documentation

The Green Design Tools CD includes the complete set of DOE-2 technical manuals.

Recent Files List

Recently used project files are listed in the File menu and can be opened with a single click.

Unlimited Technical Support

With the purchase of VisualDOE 3.0 there is unlimited technical support (Previously $195 per year).

VisualDOE 3.0 Training

Introductory Training

Eley Associates is offering free introductory training for VisualDOE 3.0 at their San Francisco office. The sessions will help beginners get started and introduce current users to the new features. The same material will be presented at each session, so choose the day that works for you. Reservations are required; contact Patricia@eley.com.

- April 5 Thursday, 3:00 p.m. to 5:00 p.m.
- June 7 Thursday, 3:00 p.m. to 5:00 p.m.

Customized Training

Customized training is available on request. Half- to two-day sessions are possible

ELEY ASSOCIATES INTRODUCES THE GREEN DESIGN TOOLS SUITE OF SOFTWARE FOR BUILDING ENERGY SIMULATION AND ANALYSIS. IN ADDITION TO VISUALDOE 3.0, THE SUITE INCLUDES A HOST OF NEW PROGRAMS AND UTILITIES FOR AIDING THE USERS WITH COMMON BUILDING ENERGY ANALYSIS TASKS. AVAILABLE ON ONE CD.

The Green Design Tools Suite of Software includes these programs:

- **VisualDOE 3.0** **State of the art building energy simulation program.**
- **VisualPlant** **Powerful central plant analysis software.**
- **VisualRate** **Energy cost calculator and utility rate editor.**
- **VisualSch** **A user-friendly graphical interface for editing schedules.**
- **VisualConst** **A graphical envelope construction editor and performance calculator.**

VisualDOE 3.0

State of the art building energy simulation program. Please see the description of the new VisualDOE 3.0 on p. 18.

VisualPlant

Powerful central plant analysis software. Several standard load profiles for the 16 California climate zones are included.

VisualRate

Energy cost calculator and utility rate editor. This software tool enables users to evaluate different utility rates by importing and scaling a profile of electricity and gas use.

VisualSch

A user-friendly graphical interface for editing existing schedules in DOE-2 or EnergyPlus input files

VisualConst

A graphical envelope construction editor and performance calculator. This utility enables users to easily edit constructions and materials by simply dragging and dropping.

All this software is available on a single CD. Contact Patricia@eley.com or call 415 957 1977.

ENERGY-10, Version 1.3 with WeatherMaker

Version 1.3 of ENERGY-10 is now available. It includes the much-anticipated ***WeatherMaker*** function. *WeatherMaker* allows users to create their own weather files based on information available from nearly 4,000 weather stations throughout the U.S. Revisions to the program itself include some minor fixes, an improved and expanded Help section, and greater clarity in titling and identification of various sections. Contact the Sustainable Buildings Industries Council for more information, or to order your upgrade disc (the cost is $15, which covers production and shipping).

ENERGY-10, written in C^{++}, is a design tool for smaller residential or commercial buildings that are less than 10,000 ft^2 floor area, or buildings that can be treated as one- or two-zone increments. It performs whole-building energy analysis for 8760 hours/year, including dynamic thermal and daylighting calculations. ENERGY-10 was specifically designed to facilitate the evaluation of energy-efficient building features in the very early stages of the design process.

Input: Only four inputs required to generate two initial generic building descriptions. Virtually everything is defaulted but modifiable. As the design evolves, the user adjusts descriptions using fill-in menus (utility-rate schedules, construction details, materials).

Output: Summary table and 20 graphical outputs available, generally comparing current design with base case. Detailed tabular results also available.

Platform: PC-compatible, Windows 3.1/95/98, Pentium processor with 16 MB of RAM is recommended.

Douglas K. Schroeder
1331 H Street N.W., #1000
Washington, DC 20004

Tel: 202.628.7400 ext 210
Fax: 202.383.5043
www.sbicouncil.org

Sustainable Buildings Industry Council (SBIC)

New DOE-2 Consultant

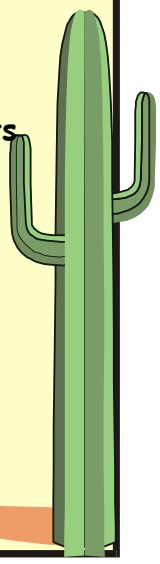
Quantum Computer Resources (QCR) specializes in the energy analysis of commercial buildings, schools, hospitals, large industrial and thermal storage projects

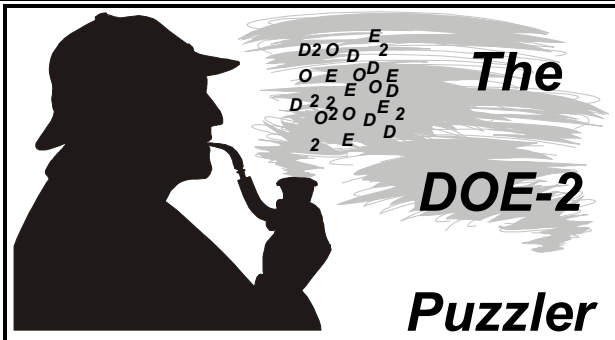
Dale R. Broughton, P. E.

Quantum Computer Resources
20833 North 1st Drive
Phoenix, AZ 85027

net: www.qcr-usa.com
email: drb6@home.com

Tel: 623.780.3496
Fax: 623.322.0049





The DOE-2 Puzzler

Q: When modeling typical buildings with common systems (e.g., a 5-zone multi-story office building with a VAV economizer system) the auto-size feature in DOE-2 doesn't always result in all of my loads being met by the system. How can I improve system sizing?

A: If you have a large unconditioned space (e.g., a plenum) next to your zones, specify under ZONE-CONTROL the keywords DESIGN-HEAT-T and DESIGN-COOL-T for the unconditioned space; use the zone keyword SIZING-OPTION = ADJUST-LOADS

Q: A proposed building system to be evaluated in DOE-2 can be described as a 2-pipe fan coil system with outdoor air and baseboards in the perimeter zones. The fan coils only deliver cooling to the zones. How would you model this in DOE-2?

A: You cannot model baseboards with a 2-pipe fan coil system that provides only cooling. Instead, model all zones with a 4-pipe fan coil system.

- Specify the actual baseboard rating in the perimeter zones.
- Specify baseboard rating = 0 for all other zones (default). Baseboard control supercedes heating from the fan coil. However, if the core zones do require heating, heating may occur from the fan coil unit.

Many thanks to Ellen Franconi (ellenf@schiller.com) for the DOE-2 tips contained herein.

Finite Technologies, Inc. (FTI) releases FTI/DOE, Version 3.0

Finite Technologies Inc. (FTI) has just released an upgrade to their FTI/DOE software. The latest version 3.0 now supports all current Windows platforms (95, 98, ME, NT and 2000), Solaris, Intel and Sparc (full 64 bit on Sparc), and Linux (Linux support is in beta now). Included with this version are the v. 112 MOD's from LNBL, on-line update of the software via the Internet, complete electronic versions of all DOE-2 manuals, on-line help and a new Graphical User Interface (GUI).

The new interface is a 100% Java application and is fully portable across all Java compatible systems and includes a "plug-in" feature that allows users and third parties to write extensions to the interface and then just add them in. FTI has built a library on their web site to post both freeware and commercial plug-ins to promote a free and open environment to benefit the DOE-2 user community. The plug-in architecture offered in the GUI is simple and examples of code and instructions on how to write plug-ins can be found on our web site.
Once a plug-in is written you simply copy the JAR file into the plug-in directory and then start the program and the new plug-in is now part of the program.

Finite Technologies has been providing a commercial version of the DOE-2 software since 1991. The current version 3.0 is now shipping. Pricing for FTI/DOE is $999 for Windows platforms, please check our web site for pricing on other platforms.

Scott Henderson
3763 Image Drive
Anchorage Alaska 99504
Phone: 907.337.2860
Fax: 907.333.4482
E-mail: scott@finite-tech.com
http://www.finite-tech.com

Building Design Advisor 2.0

Decision making through the integrated use of multiple simulation tools and databases

The **Building Design Advisor** (**BDA)** is a Windows program that addresses the needs of building decision-makers from the initial, schematic phases of building design through the detailed specification of building components and systems. The BDA is built around an object-oriented representation of the building and its context, which is mapped onto the corresponding representations of multiple tools and databases. It then acts as a ***data manager*** and ***process controller***, automatically preparing input to simulation tools and integrating their output in ways that support multi-criterion decision making. The latest public release of BDA (version 2.0) is linked to three main applications:

- A **Schematic Graphic Editor (SGE)**, for graphic input of building components and systems,
- **DElight**, a simplified daylighting simulation tool, and
- the **DOE-2.1E** building energy simulation program.

The following **enhancements** have been made to BDA 2.0 (as of 09/15/00):

- Greater flexibility in project development with features such as "Save as.."
- Greater user control over object properties with editing of Solution and Story properties, building azimuth, etc.
- User interface enhancements allow easier navigation of the building model with less ambiguities.
- Several bug fixes.
- Extended documentation.

Current research and development efforts are focused on the development of links to:

- **Desktop Radiance**, a Windows 95/98/NT version of the **Radiance** lighting/daylighting simulation and rendering software, and
- **Athena**, a life-cycle analysis of embodied energy and environmental impact of materials.
- **Electric lighting simulation**

The minimum and recommended system **requirements** to run the BDA software are as follows:

Minimum	**Recommended**
Pentium 75	Pentium 200 or better.
Windows 95, 98, NT 4.0.	Windows 95, 98, NT 4.0.
16 / 32MB RAM under Windows 95	24 / 64MB RAM under Windows NT 4.0.
30 MB of larger hard disk space.	60 MB of larger hard disk space.
640x480 or higher screen resolution.	1024x768 or higher screen resolution.

The BDA source code is available for licensing; if interested, please contact Dr. Papamichael at K_Papamichael@lbl.gov.

To learn more about the BDA software and to download a copy of the latest public version, please visit

http://kmp.lbl.gov/BDA

DOE-2 DOE-2 DOE-2

PC Version of DOE-2.1E from ESTSC

DOE-2.1E (version 110) for Windows is available from the Energy Science and Technology Software Center (ESTSC). Previously, ESTSC licensed only UNIX and VAX versions. This updated version of DOE-2 incorporates bug fixes and new features such as a Cooled Beam HVAC system and polygon input for walls, floors and ceilings. Like previous DOE-2.1E products from ESTSC, this version accepts textual BDL input but does not have a graphical user interface. Cost of DOE-2.1E-WIN (Version 110) is:

$ 300 U.S. Government, non-profit Educational
$ 575 U.S., Mexico, Canada
$ 1075 Other Foreign

Ed Kidd ***Phone: 865/576-1037***
NCI Information Systems, Inc. ***Fax: 865/576-6436***
Energy Science and Technology Software Center ***Email: estsc@adonis.osti.gov***
P.O. Box 1020
Oak Ridge, TN 37831

DOE-2.1E Documentation on a CD

Most of the DOE-2.1E documentation (plus the Engineers Manual, version 2.1A) has been scanned and put on one CD, available for $100US from ESTSC. Call Ed Kidd to order. See previous pages for details. DOE-2.1E Basics and the DOE-2.1E Sample Run Book are not included on the CD; they may be ordered from the National Technical Information Service; go to http://SimulationResearch. lbl.gov >DOE-2 > Documentation.

DOE-2.1E Documentation Updates Free of Charge

Update packages are available on our website (http://SimulationResearch. lbl.gov > DOE-2 > Documentation). Note that the Update Packages are ***not*** cumulative; each package contains new information so you need to download all the packages, not just the most recent.

DOE-2 Help Desk

Due to health problems, our regular consultant, Bruce Birdsall, is temporarily unavailable.
In the meantime, please contact the Simulation Research Group with your questions:
Phone: (510) 486-5711, Fax: (510) 486-4089, Email: klellington@lbl.gov

DOE-2 Training

DOE-2 courses for beginning and advanced users:
phone Marlin Addison at (602) 968-2040, or send email to marlin.addison@doe2.com

DOE-2 DOE-2 DOE-2

Software Available from Lawrence Berkeley National Laboratory

Downloads	
BDA 2.0 (Building Design Advisor)	kmp.lbl.gov/BDA
COMIS (multi-zone air flow and contaminant transport model)	www-epb.lbl.gov/comis
EnergyPlus™ (new-generation whole-building energy analysis program, combining best features of BLAST and DOE-2)	To beta test EnergyPlus go to SimulationResearch.lbl.gov > EnergyPlus
GenOpt®**1.1** (generic optimization program)	SimulationResearch.lbl.gov > GenOpt
RADIANCE (analysis and visualization of lighting in design)	radsite.lbl.gov/radiance/
Desktop Radiance (integrates the Radiance Synthetic Imaging System with AutoCAD Release 14)	radsite.lbl.gov/deskrad/
RESEM (Retrofit Energy Savings Estimation Model) (calculates long-term energy savings directly from actual utility data)	eetd.lbl.gov/btp/resem.htm
SUPERLITE (calculate illuminance distribution for room geometries)	eetd.lbl.gov/btp/superlite20.html
THERM 2.1 (model two-dimensional heat-transfer effects in building components where thermal bridges are of concern)	windows.lbl.gov/software/therm/therm.html
WINDOW 4.1 (thermal analysis of window products)	windows.lbl.gov/software/window/window.html
Request by Fax from 510.486.4089	
RESFEN 3.1 (choose energy-efficient, cost-effective windows for a given residential application)	windows.lbl.gov/software/resfen/resfen.html
Web Based	
Home Energy Saver (quickly compute home energy use)	hes.lbl.gov
Purchase	
SPARK (Simulation Problem Analysis and Research Kernel) (build simulations of innovative building envelope and HVAC systems by connecting component models)	For Windows, SUN, Linux, go to SimulationResearch.lbl.gov > SPARK
ADELINE 2.0 (day/lighting performance in complex spaces)	radsite.lbl.gov/adeline/

Meetings, Conferences, Symposia

9th National Conference on Building Commissioning

To be held
May 9-11, in Cherry Hills, NJ
Contact: Carolyn Dasher, Conference Manager
Tel: 503.248.4636 x 204
Fax: 503.295.0820
Email: cdasher@peci.org
Net: http://www.peci.org/ncbc

NCBC 2001

IBPSA

BUILDING SIMULATION 2001

To be held
August 13-15, in Rio de Janeiro, Brazil

All information may be found at the BS2001 web site: www.labeee.ufsc.br/bs2001/

ACEEE

American Council for an Energy Efficient Economy

Increasing Productivity through Energy Efficiency
ACEEE 2001 Summer Study on Energy Efficiency in Industry

To be held
July 24-27 in Tarrytown, NY
Contact: Rebecca Lunetta
Email: rlunetta@erols.com
Net: http://aceee.org

ASHRAE

- - - - - - - 2001 - - - - - - -

ASHRAE Annual Meeting
To be held
June 23-27 in Cincinnati, OH

- - - - - - - 2002 - - - - - - -

ASHRAE Winter Meeting
To be held
January 12-16 in Atlantic City, NJ

ASHRAE Annual Meeting
To be held
June 22-26, Honolulu, HI

- - - - - - - 2003 - - - - - - -

ASHRAE Winter Meeting
To be held
January 25-29 in Chicago, IL

ASHRAE Annual Meeting
To be held
June 28-July 2 in Kansas City, MO

- - - - For information, Contact - - - -
Contact: jyoung@ashrae.org
ASHRAE Meetings Section
1791 Tullie Circle NE
Atlanta, GA 30329
Tel: 404.636.8400 -- Fax: 321.5478
Net: http://www.ashrae.org

BLAST*news*

www.bso.uiuc.edu

Building Systems Laboratory (BSL)
30 Mechanical Engineering Building
University of Illinois
1206 West Green Street
Urbana, IL 61801
Telephone: (217) 333-3977
Fax: (217) 244-6534
support@blast.bso.uiuc.edu

The **Building Loads Analysis and System Thermodynamics (BLAST** program predicts energy consumption, energy system performance and cost for new or existing (pre-retrofit) buildings.

BLAST contains three major sub-programs:

- **Space Load Prediction** computes hourly space loads in a building based on weather data and user inputs detailing the building construction and operation.
- **Air Distribution System Simulation** uses the computed space loads, weather data, and user inputs.
- **Central Plant Simulation** computes monthly and annual fuel and electrical power consumption.

Heat Balance Loads Calculator (HBLC)
The BLAST graphical interface (HBLC) is a Windows-based interactive program for producing BLAST input files. You can download a demo version of HBLC (for MS Windows) from the BLAST web site (User manual included).

HBLC/BLAST Training Courses
Experience with the HBLC and the BLAST family of programs has shown that new users can benefit from a session of structured training with the software. The Building Systems Laboratory offers such training courses on an as needed basis typically at our offices in Urbana, Illinois.

WINLCCID 98
LCCID (Life Cycle Cost in Design) was developed to perform Life Cycle Cost Analyses (LCCA) for the Department of Defense and their contractors.

To order BLAST-related products, contact the Building Systems Laboratory at the address above.

Program Name	Order Number	Price
PC BLAST Includes: BLAST, HBLC, BTEXT, WIFE, CHILLER, Report Writer, Report Writer File Generator, Comfort Report program, Weather File Reporting Program, Control Profile Macros for Lotus or Symphony, and the Design Week Program. The package is on a single CD-ROM and includes soft copies of the BLAST Manual, 65 technical articles and theses related to BLAST, nearly 400 processed weather files with a browsing engine, and complete source code for BLAST, HBLC, etc. Requires an IBM PC 486/Pentium II or compatible running MS Windows 95/98/NT.	3B486E3-0898	$1500
PC BLAST Package Upgrade from level 295+	4B486E3-0898	$450
WINLCCID 98: executable version for 386/486/Pentium	3LCC3-0898	$295
WINLCCID 98: update from WINLCCID 97	4LCC3-0898	$195
The last four digits of the catalog number indicate the month and year the item was released or published. This will enable you to see if you have the most recent version. All software will be shipped on 3.5" high density floppy disks unless noted otherwise.		

www.bso.uiuc.edu

PG&E Spring 2001 Programs

Pacific Gas and Electric Company™

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To register call 415.973.7268 or go to www.pge.com/pec

HVAC

March 21 (Wednesday) 9:00 am to 4:30 pm	**Designing Underfloor Air Systems** Issues and design strategies for HVAC systems using underfloor air distribution.
March 29-30 (Thursday-Friday) 9:00 am to 4:30 pm	**Geothermal Systems for Commercial Buildings** System specifications, ventilation design strategies, ground loop layout, pump selection and hands-on use of design software programs.
May 17 (Thursday) 9:00 am to 4:30 pm	**HVAC Load Calculation Methods and Applications** Discussion of common load calculation methods used to size equipment and distribution systems.
May 23 (Wednesday) 9:00 am to 4:30 pm	**Evaporative Cooling** Design of direct and indirect evaporative cooling systems, evaporative pre-cooling for air-cooled condenser, indoor air quality issues, energy savings calculations.

ARCHITECTURE

April 17 (Tuesday) 9:00 am to 4:30 pm	**Commercial HVAC Systems and Concepts for Architects** This introductory-level program provides an overview of building loads and mechanical system types.
April 18 (Wednesday) 6:00 pm to 9:00 pm	**The Glass Class** Learn the performance characteristics of high performance glazing and how to specify it for your projects. Discover how shading devices affect glazing performance, energy efficiency and quality of the indoor environment.
May 22 (Tuesday) 9:00 am to 1:00 pm	**Controlling Moisture in Residential and Small Commercial Buildings** Common design and installation defects that can create moisture problems; recommendations for good practices, mitigation of mold/mildew, building mate-rials that improve building durability, energy efficiency and indoor air quality.
June 20 (Wednesday) 6:00 pm to 9:00 pm **or** **June 21** (Thursday) 6:00 pm to 9:00 pm	**Site Analysis for Architects** How to assess climate data, apply site analysis techniques, and use measurement tools to design energy-efficient buildings.

LIGHTING

March 27 (Tuesday) 9:00 am to 4:30 pm	**Lighting Fundamentals** Basic concepts, terminology, light and color theory, controls, calculations, etc.

BUILDINGS FOR THE 21ST CENTURY

LECTURE SERIES 2001
AT THE NATIONAL BUILDING MUSEUM

ENERGYPLUS:

DOE'S Next-Generation BUILDING ENERGY SIMULATION SOFTWARE

Thursday, April 12, 2001 **12:30 p.m. – 1:30 p.m.**
National Building Museum **401 F St., NW, Washington, DC**

Looking at buildings from a "whole building" perspective requires an analysis of complex, integrated systems.

The latest information technologies dramatically improve whole-building approaches in design, planning, and construction. The convergence of information and energy technologies are opening new doors for energy savings, cost savings, and indoor environmental quality. User-friendly software is now making it as easy as the click of a mouse.

The U. S. Department of Energy will unveil EnergyPlus, a new-generation building energy simulation program from the creators of BLAST and DOE-2. Design, construction, and real estate professionals who want to minimize energy use and cost, and optimize building performance, will not want to miss the demonstration of this powerful new software.

Demonstrations will also include the latest upgrades to other DOE software, including:

- **Building Design Advisor** – a program for the initial, schematic phases of building design through the detailed specification of building components and systems, and
- **Energy-10** – a program for small buildings that integrates day lighting, passive solar heating, and low-energy cooling strategies with energy-efficient envelope design and mechanical equipment.

– SPECIAL BONUS –
A free EnergyPlus CD for the first 100 guests.

DRURY B. CRAWLEY manages the Building Energy Tools and Commercial Buildings R&D programs at the U.S. Department of Energy. He has more than 20 years experience working in energy efficiency and renewable energy for government organizations and private sector companies. As a registered architect, Mr. Crawley is active in ASHRAE, AIA, IBPSA, and IEA, and has published more than 80 papers and articles on building energy efficiency, sustainability, and renewable energy topics.

MARK YOUR CALENDARS NOW!

May 23 **Judy Heerwagen, Ph. D., Pacific Northwest National Laboratory**
Why Should *Green Buildings Yield Productivity Benefits?*

Look for more information coming your way soon!

No registration is necessary. Space is limited. Lectures are free and open to the public.
For information: www.nbm.org or call 202-272-2448; or www.eren.doe.gov/buildings
THE NATIONAL BUILDING MUSEUM, 401 F STREET, N.W. (Judiciary Square Metro Station)

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OFFICE OF BUILDING TECHNOLOGY, STATE AND COMMUNITY PROGRAMS
ENERGY EFFICIENCY AND RENEWABLE ENERGY
U.S. DEPARTMENT OF ENERGY